



WAN Probe Kit Installation & Quick Start Guide

Trademark Notices

© 1994-2004 by Network Instruments, LLC (Limited Liability Corporation). All rights reserved.

“Observer”, “Network Instruments” and the “N with a dot” logo are registered trademarks of Network Instruments, LLC, Minneapolis, Minnesota, USA.

Limited Warranty—Hardware

Network Instruments, LLC. (“Network Instruments”) warrants this hardware product against defects in materials and workmanship for a period of 90 days from the date of shipment of the product from Network Instruments, LLC. Warranty is for depot service at Network Instruments Corporate headquarters in Minneapolis, MN, or Network Instruments’ London, UK office. Warranties and licenses may give you more coverage in certain local jurisdictions; Network Instruments also offers extended warranties as part of its maintenance agreement program.

If a defect exists, at its option Network Instruments will (1) repair the product at no charge, using new or refurbished replacement parts, or (2) exchange the product with a product that is new or which has been manufactured from new or serviceable used parts and is at least functionally equivalent to the original product. A replacement product assumes the remaining warranty of the original product or 60 days, whichever provides longer coverage for you. When a product or part is exchanged, any replacement item becomes your property and the replaced item becomes Network Instruments’ property. This manual is furnished under license and may only be used or copied in accordance with the terms of such license. The information in this manual is furnished for informational use only, is subject to change without notice, and should not be construed as a commitment by Network Instruments, LLC. Network Instruments, LLC assumes no responsibility or liability for any errors or inaccuracies that may appear in this manual. Network Instruments, LLC does not warrant that the hardware will meet your requirements or that the operation of the hardware will be uninterrupted or that the hardware will be error-free.

NETWORK INSTRUMENTS, LLC SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL NETWORK INSTRUMENTS, LLC BE LIABLE FOR ANY LOSS OF PROFIT OR ANY OTHER COMMERCIAL DAMAGE, INCLUDING BUT NOT LIMITED TO SPECIAL,

Limited Warranty—Software

Network Instruments, LLC will replace defective media or documentation for a 60-day period after the shipment of the product from Network Instruments, LLC. Should Network Instruments, LLC release a newer version of the software within 60 days of shipment of the product, Network Instruments, LLC will update the copy of the software upon request, provided request is made by the licensed user within the 60-day period of shipment of the new version. This update may consist of a CD, or a manual, or both at the discretion of Network Instruments, LLC. User may be charged a shipping fee for updates.

Network Instruments, LLC shall not be liable for material, equipment, data, or time loss caused directly or indirectly by proper or improper use of the software. In cases of loss, destruction, or corruption of data, Network Instruments, LLC shall not be liable. Network Instruments, LLC does not take any other responsibility. Network Instruments, LLC does not warrant that the product will meet your requirements or that the operation of the product will be uninterrupted or that the product will be error-free.

NETWORK INSTRUMENTS, LLC SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL NETWORK INSTRUMENTS, LLC BE LIABLE FOR ANY LOSS OF PROFIT OR ANY OTHER COMMERCIAL DAMAGE, INCLUDING BUT NOT LIMITED TO SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGES.

Network Instruments, LLC makes no other warranty, expressed or implied.

Technical Support

Network Instruments provides technical support:

By phone (depending on where you are located):

US & Countries outside Europe at (952) 932-9899

UK and Europe at +44 (0) 1959 569880

By fax (depending on where you are located):

US & Countries outside of Europe at (952) 932-9545

UK and Europe at +44 (0) 1959 569881

Or by email at:

support@networkinstruments.com

Network Instruments provides technical support for a period of 90 days after the purchase of the product at no charge. After the 90-day initial support period, support will only be provided to those customers who have purchased a maintenance agreement.

Telephone technical support hours are between 9:00am and 5:00pm (local time for each office).

Suggestions are welcomed. Many of the improvements made to our products have originated as end user suggestions. Please submit detailed suggestions in writing to: support@networkinstruments.com or by fax at: (952) 932-9545. Please submit any corrections to or criticism of Network Instruments' publications to: pubs@networkinstruments.com or by fax at (952) 932-9545.

To subscribe to the Network Instruments email newsletter (delivered in HTML format), send an email to:

End User License Agreement

license@networkinstruments.com
Network Instruments' products are neither shareware nor freeware. Network Instruments' products are commercial software and/or hardware products that are subject to international copyright laws.

Upon purchase and registration of the specific Network Instruments' product, you have a non-transferable right to use the specific product at **one** site on **one** network **one** personal computer (PC). Additional networks can be monitored by purchasing additional Probe licenses or Observer licenses which will grant you the right to use additional Probes, Probe instances, or consoles for each license purchased. The purchase of a Probe does not include a license for Observer. Should you need additional Observer consoles, you will need to purchase additional licenses separately.

To install Network Instruments' Observer on additional PCs or laptops, you must purchase an additional Observer license for each system. If you are installing Probes on PCs or laptops, you will need to purchase a Probe for each system.

Network Instruments' Observer software and license numbers are the property of Network Instruments, LLC and may not be copied by any means for purposes other than backup.

After you purchase a Network Instruments software license, you will receive license and activation numbers. These license and activation numbers are your proof of purchase. You will need to produce this information for upgrades. You may need to provide the activation numbers to receive technical support.

This software is licensed as stated above. The license does not constitute ownership of the software, only the right to use the software.

Contents

Getting Started	1
Installation Overview	1
Unpacking and Inspecting the Parts	2
Hardware and Software Requirements	3
Hardware Requirements	3
Software Requirements	3
WAN Probe Kit Quick Installation Diagrams	4
Digital T1/E1 TAP Quick Installation Diagram (2-Port)	4
Digital DS3/E3 TAP Quick Installation Diagram	5
Installing the Interface Cards and Drivers	9
Safety and Handling Precautions	9
Installing the Interface Cards	10
Updating the WAN and 10/100 Drivers	11
WAN and 10/100 Driver Installation: Windows 2000	11
WAN and 10/100 Driver Installation: Windows XP	18
Configuring Ports Into Logical Links	23
Starting the Configuration Utility	23
TAP Status LEDs and Switches	24
Digital T1/E1 TAP	25
Digital DS3/E3 TAP	25
Serial T1 TAP	25
HSSI TAP	25
Running Observer Software with the WAN Probe	27
WAN Probe/Device Setup	27
Digital DS3/E3/HSSI Probe Settings	28
Digital T1/E1 Probe Settings	28
Serial T1/E1 Probe Settings	29
Operating Observer Passively	29
Analyzing a WAN Link with Observer	30
Discover Network Names	30
Bandwidth Utilization	32
WAN Vital Signs by DLCI	32
WAN Load by DLCI	33
Top Talkers	35
WAN Filtering	36
Triggers and Alarms	37



Getting Started

Thank you for purchasing Network Instruments WAN Probe Kit. The WAN Probe Kit, when coupled with Network Instruments Observer[®] software, offers full-featured frame capture, decode, and analysis for T1/E1, DS3/E3 and HSSI WAN links.

Installation Overview

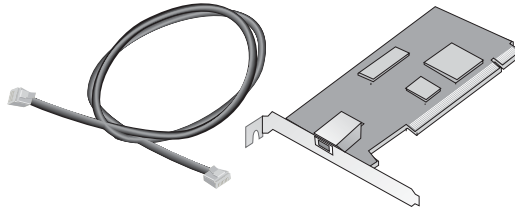
To install the WAN Probe Kit, you must follow these overall steps:

1. Make sure that your system meets the requirements for hardware and software installation as described in **Hardware and Software Requirements** on page 3 of this *Guide*.
2. Install the network interface cards (NICs), and their custom software drivers. See **Installing the Interface Cards and Drivers** on page 9 of this *Guide* for detailed instructions.
3. Cable the NICs to the network. See “WAN Probe Kit Quick Installation Diagrams” on page 4 for a diagram that shows how to cable the TAP for a T1/E1 link; page 5 shows how to cable the TAP for a DS3/E3 link.
4. Run the WAN Configuration Utility (NIWANCFG.EXE) to define and name the links you wish to monitor.
5. Install and run the Probe software. See the *RMON1/2 & Advanced Probe User Guide* for details.
6. Run Observer and redirect the WAN Probe to the Observer console. See **Running Observer Software with the WAN Probe** on page 27 of this *Guide* for important information about running Observer with the WAN Probe Kit.

Unpacking and Inspecting the Parts

Your WAN Probe Kit includes a number of components. Take a moment after unpacking the kit to locate and inspect all of the parts.

- One (1) 10/100 Ethernet Network Interface Card and cable:



- The Network Instruments *Product CD-ROM/Application CD*, the *WAN Probe Kit Installation and Quick Start Guide* (this manual), the *RMON1/2 & Advanced Probe User Guide*, and the *Probe License Card*:



- Depending on the option you purchased, one of the following TAP kits, each of which includes a WAN Interface, TAP, and cables:

Digital DS3/E3 TAP Kit

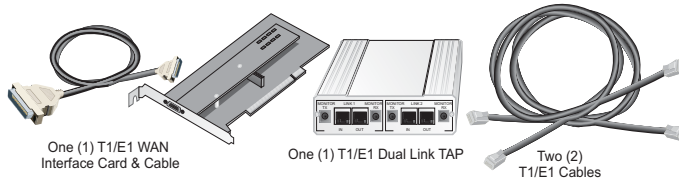


One (1) DS3/E3 WAN Interface Card & Cable

One (1) DS3/E3 TAP

One (1) full-duplex DS3/E3 Coax Cable

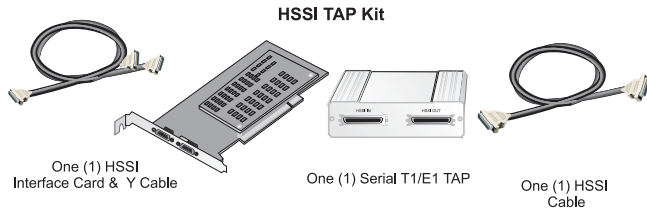
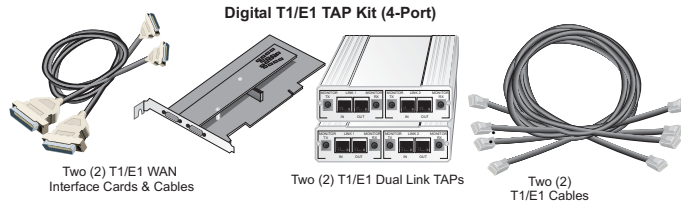
Digital T1/E1 TAP Kit (2-Port)



One (1) T1/E1 WAN Interface Card & Cable

One (1) T1/E1 Dual Link TAP

Two (2) T1/E1 Cables



Hardware and Software Requirements

Make sure that the system on which you plan to install the Probe Kit meets these requirements before you begin installing the kit.

Hardware Requirements

The PC must meet or exceed these specifications:

- To guarantee T1/E1 or DS3/E3 wire-speed: Pentium III 1.3 GHz or AMD 1700 1 GHz or faster.
- 512MB RAM
- 20 GB hard disk space
- 2 available PCI slots

Software Requirements

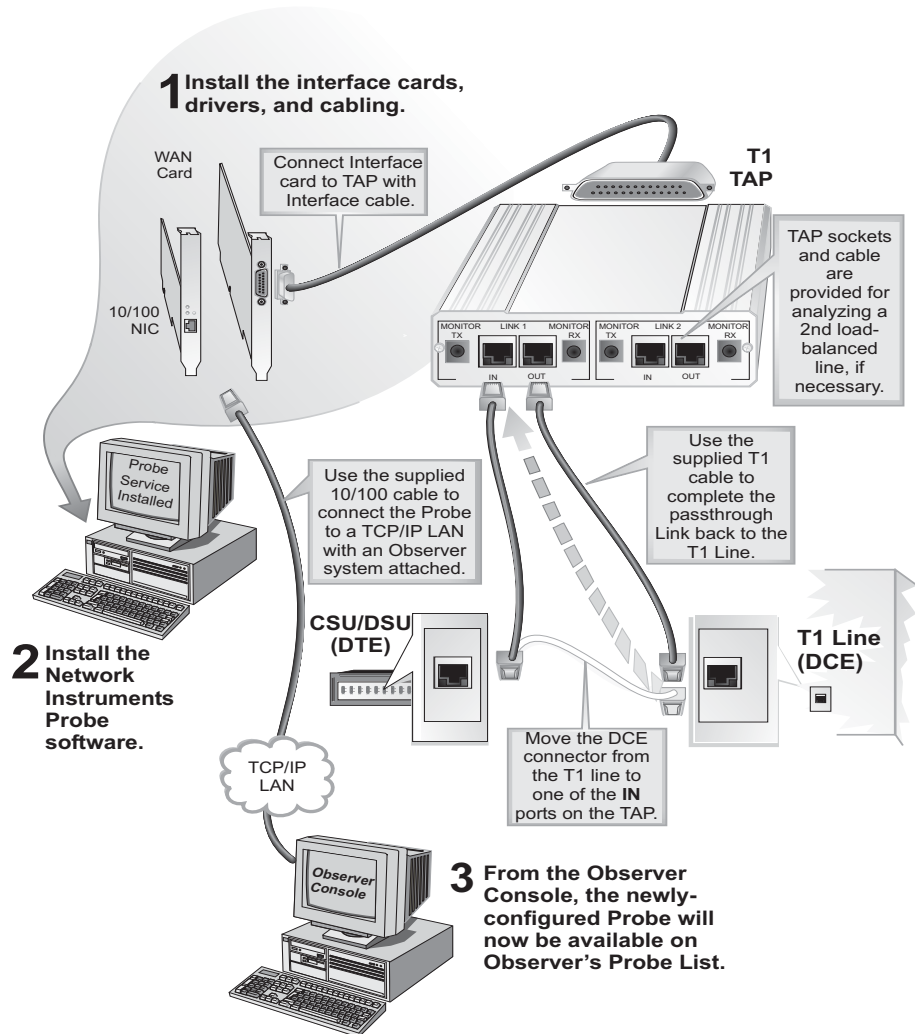
The WAN Probe must be installed on Windows 2000 or Windows XP. Only the latest versions of Expert Observer and Observer Suite consoles are guaranteed to connect to the WAN Probe.

WAN Probe Kit Quick Installation Diagrams

Follow the diagrammed steps below to install the WAN Probe Kit. More detailed NIC and software installation instructions follow in this *Guide*.

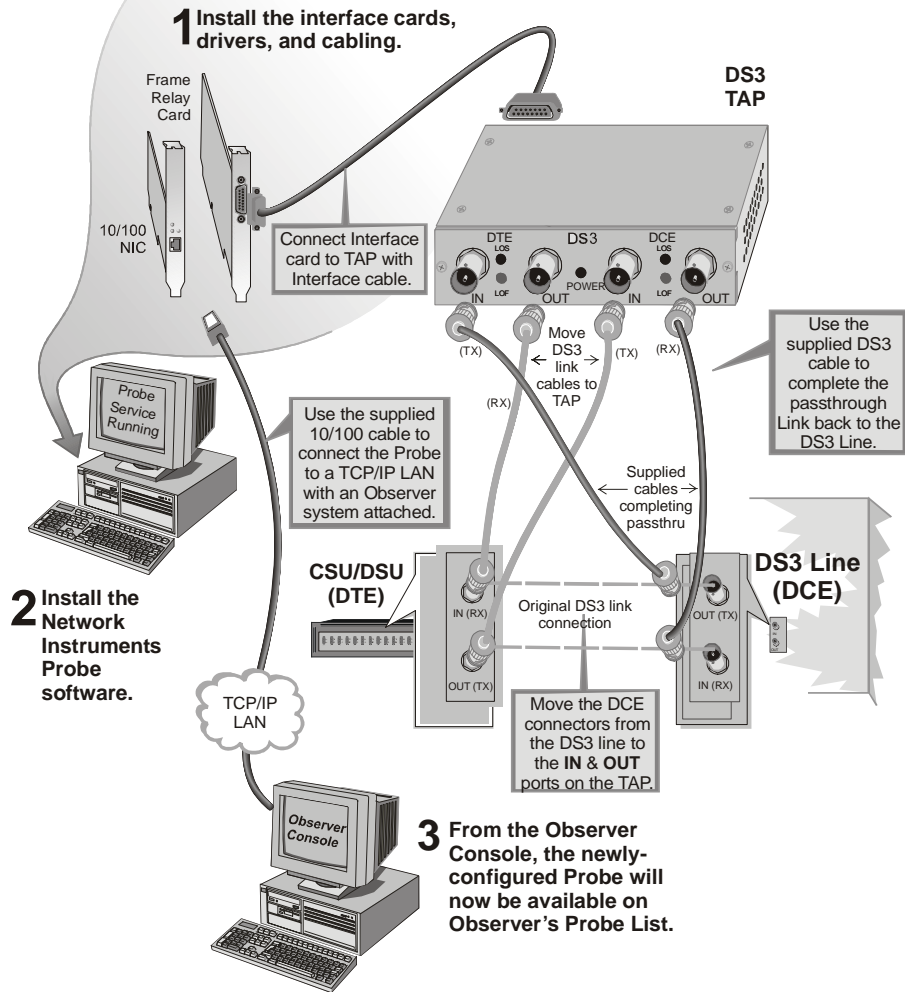
Digital T1/E1 TAP Quick Installation Diagram (2-Port¹)

The diagram below shows the WAN Probe Kit as it would be cabled to analyze a digital T1/E1 link with a Channel Service Unit/Data Service Unit (CSU/DSU). For a DS3/E3 and Serial T1 cabling diagrams, see the following pages.

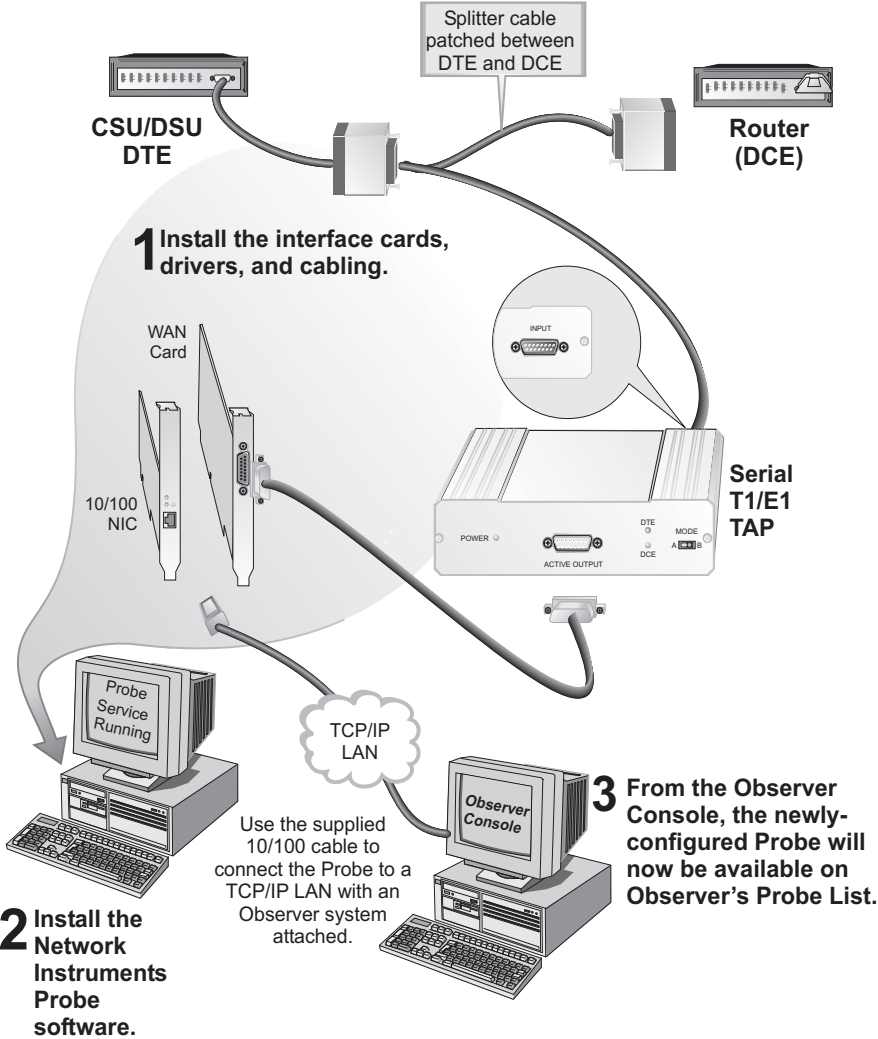


1. The 4-Port version of this system has an additional PC interface card, and an additional TAP and cable kit. Connect the second TAP kit as shown in the diagram. Run NIWANCFG to define and name the links you want to monitor.

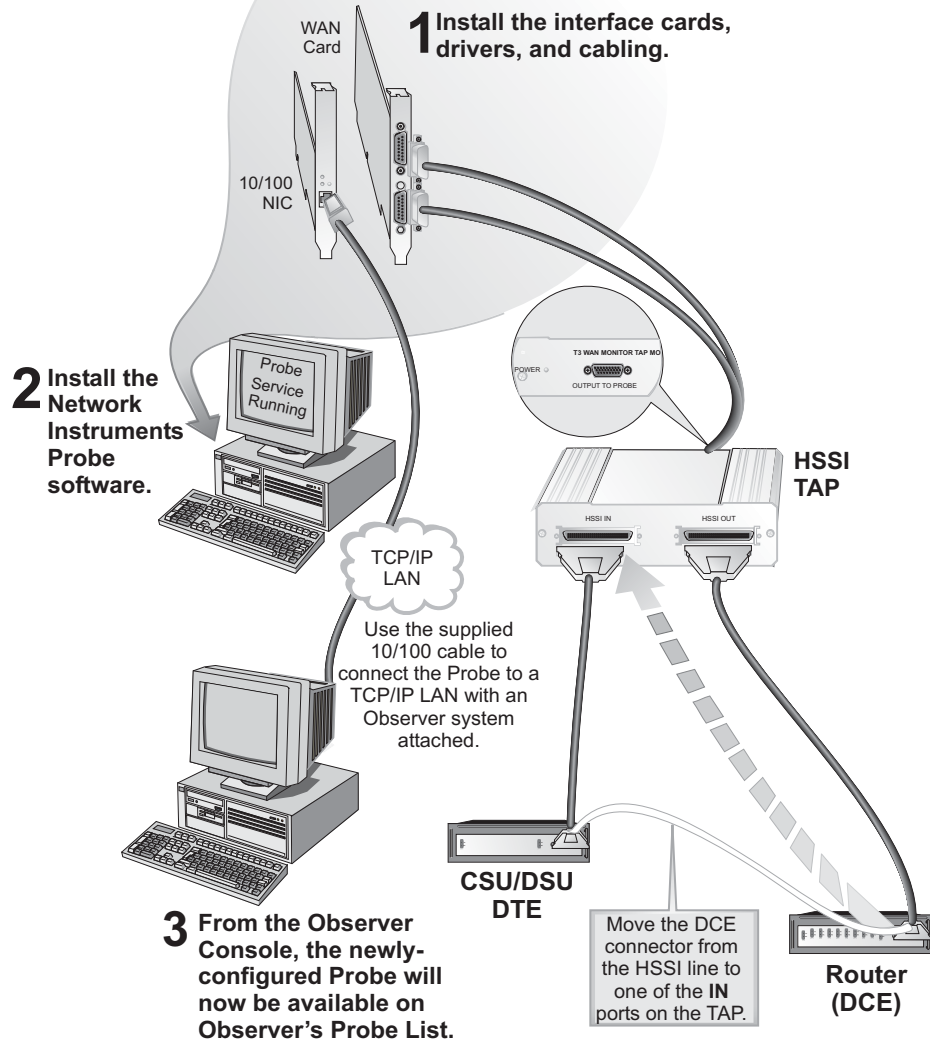
Digital DS3/E3 TAP Quick Installation Diagram



Serial T1 TAP Quick Installation Diagram



HSSI TAP Quick Installation Diagram



1. Install the Interface Cards, Drivers, and Cabling

The TAP kit allows the Probe to capture frames from a T1/E1 or DS3/E3 link. The 10/100 NIC allows the Probe to communicate with the Observer console via TCP/IP, or to capture packets from a 10/100 network.

- For detailed card installation instructions, refer to **Installing the Interface Cards** on page 10 of this Guide.

For driver installation instructions, refer to **Updating the WAN and 10/100 Drivers** on page 11 of this Guide.

2. Install the Probe Software

The Probe software turns the system into a data collection device for any Expert Observer or Observer Suite console. It also installs the custom driver files that you will use to update the NIC drivers in Step 2.

- The *Advanced and RMON Probe User Guide* describes in detail how to install and run the Probe software. When prompted for the product to install, select Advanced Probe
- Make sure that you also read and follow the instructions for software license and registration.
- Run NIWANCFG if you need to define single or multiport links.

3. Connect to the WAN Probe from the Observer Console

Once the Probe system is installed, running, and cabled, you must redirect the Probe so that it appears on the Observer main window's Probe list. From the Observer console, Click **Tools->Redirect Probe** and enter the Probe's IP address.

The Probe will now appear on the probe list on the left side of the Observer main window. Click on the Probe to connect.



Installing the Interface Cards and Drivers

Safety and Handling Precautions



Danger!



Electrical current from power, phone and communications cables can be hazardous.

To avoid potential shock hazards:

- Only use grounded sockets for connecting equipment to the power supply.
- Do not carry out any installation, maintenance or (re)configuration work and do not connect or disconnect any power cables during an electrical storm.
- If installing in a Hot Plug system, please follow the safety instructions specific to this system. Read the relevant documentation.
- Electrical installations must comply with the safety regulations relating to the country in which they are operated.



Caution

Electrostatic discharge may damage or destroy circuit boards.

- Do not open the antistatic bags until you are ready to install the cards.
- We recommend you wear an antistatic wrist strap when installing the interface cards. Remove the computer cover and connect the wrist straps (using an electric conductor) to the computer chassis. **Note: Do NOT connect the wrist strap to the ground terminal of the power supply. Faulty wiring could make this terminal live and potentially lethal.**
- Hold the antistatic packaging of the interface cards for at least two seconds against the bracket of an extension slot on your computer. This reduces the static charge in the packaging and in your body.
- Do not touch any circuits on the network cards or any of their port contacts. Do not place the network cards on the computer cover or any other metal surface.
- Avoid unnecessary movement since this can increase electrostatic charge.
- Never use excessive force when working with the network card or the PCI bus. If you need to place the network card somewhere after removing it from the antistatic bag, make sure that you place it on the antistatic bag and on a level surface.

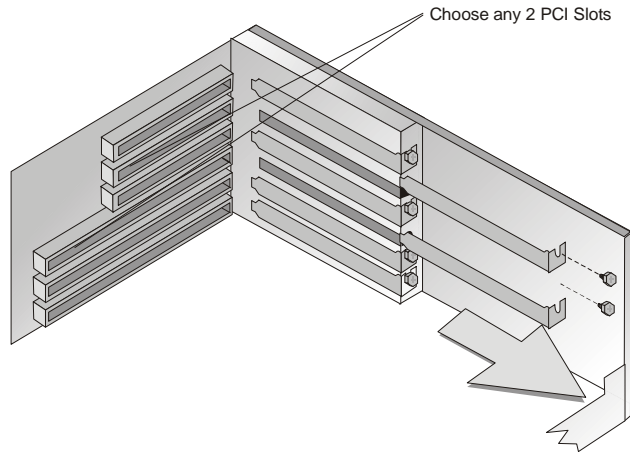
Installing the Interface Cards

Have the computer manual available and if necessary, a key or screwdriver to open the cover.

1. Install the Network Instruments Probe Software as described in the *RMONI/2 & Advanced Probe User Guide*. You must install this software **before** you install the hardware so that Windows will have access to the custom drivers.
2. Switch off the computer in which the network cards are to be installed.
3. Disconnect the power cord from the power outlet. Follow the safety instructions set out above.
4. Open the computer cover as described in your computer manual. You may need a screwdriver or key to loosen the fasteners on the cover.

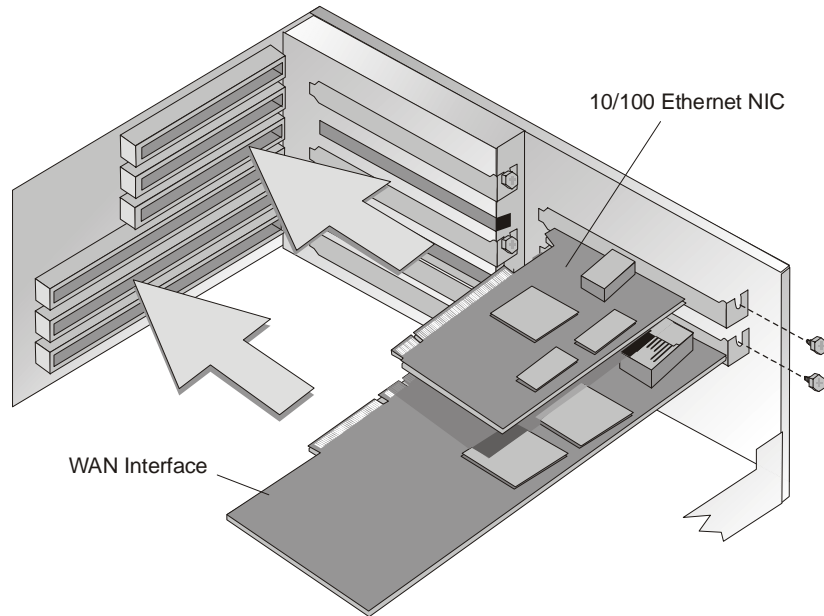
If you are installing the network cards in a tower computer it is best to lay the computer on its side so you can apply the correct force to insert the cards into the PCI bus slots.

5. Locate two open PCI bus slots on the motherboard. Consult the section in your computer manual that describes how to install expansion cards in the system motherboard.
6. Remove the brackets (if any) from the expansion slots. Follow the instructions in your computer manual.



7. Remove the interface cards from their antistatic bags.
8. Insert the interface cards in the appropriate PCI bus slots.

Make sure that the contacts of the network cards are correctly aligned with the PCI bus slots on the motherboard. Push the network cards down vertically until they are properly seated in the bus slots.



9. Tighten the locking screws on the fixing brackets until the cards are firmly connected to the computer cover (or to the attachment provided for expansion cards).
10. Close the computer cover and replace and tighten any screws.
11. Reconnect the power supply, **following the safety instructions**.
12. Turn the system on. The new hardware will be recognized differently depending on whether you are running Windows 2000 or Windows XP. Refer to the appropriate section that follows to complete the driver installation.

Updating the WAN and 10/100 Drivers

After you have installed the cards and turned on the computer, both Windows 2000 and Windows XP will attempt to recognize and install drivers to match the new hardware. Make sure that you have installed the Network Instruments Probe software; you must supply a directory that the Network Instruments install program creates to the **Found New Hardware** wizard.

WAN and 10/100 Driver Installation: Windows 2000

The procedure for each NIC is different because of the way Windows 2000 recognizes the two cards:

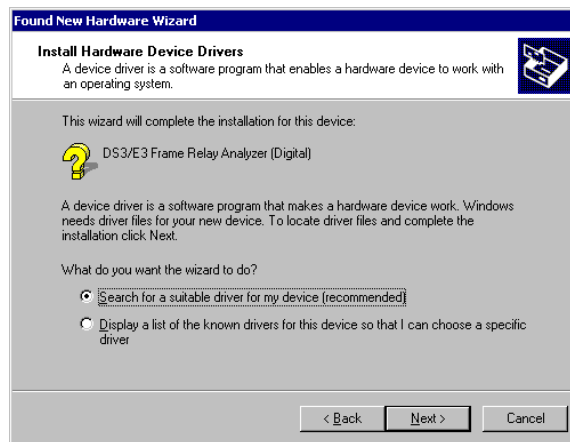
- The WAN Interface card isn't recognized at all, so you need to have already installed the Network Instruments Probe software when you turn the system on. When the **Found New Hardware** wizard asks you for the driver location, specify the **C:\Observer Files\Drivers\WAN** directory, which contains the custom driver for the WAN Interface card.
- The 10/100 card is recognized, but a standard driver is installed. You must manually update the driver, specifying its location in **C:\Observer Files\DRIVERS\Intel21143\Win2000** directory. You *must* specify the location; Windows will not install the custom driver if you tell it to search for the driver.

These procedures are described in more detail in the sections that follow.

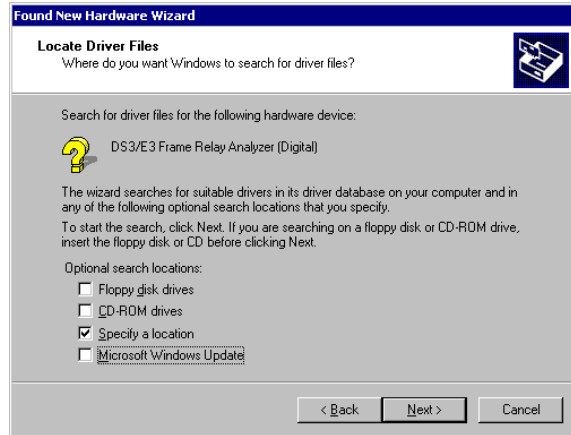
Letting the Wizard Search for the WAN Driver

When Windows 2000 starts up after the card installation, the **Found New Hardware Wizard** opening dialog is displayed. Follow these steps to complete the wizard.

1. Click **Next**. The wizard asks you how you want to install the custom driver:



2. Choose “Search for a suitable driver for my device.” Click **Next**. The wizard asks where it should look for the driver files:



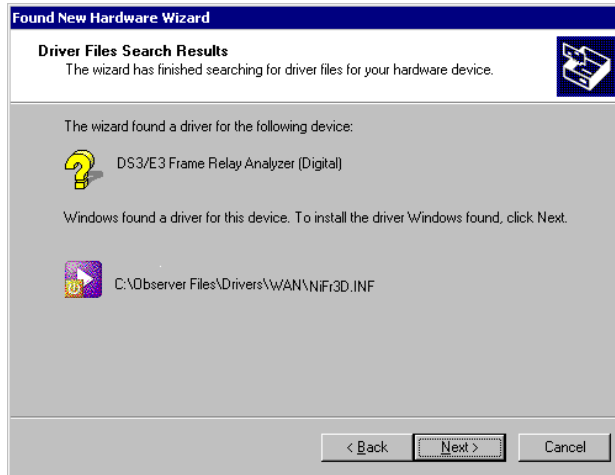
3. Choose “Specify a Location” and click **Next**.
The wizard displays a file locator:



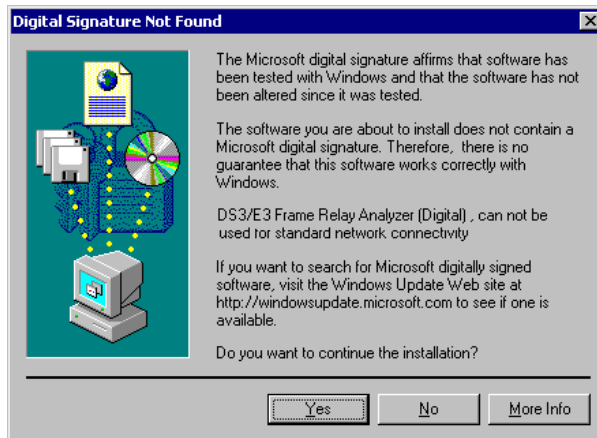
4. Enter or browse to the following directory (assuming C:\Observer Files is your Observer directory):

C:\Observer Files\DriversWAN

The wizard tells you which driver it found:



5. Click **Next**. The wizard informs you that the driver it found lacks a Microsoft digital signature:



6. Click **Yes**. Network Instruments has tested and verified that the driver works correctly with Observer and Probe on Windows 2000.

After installing the driver, the wizard displays a confirmation dialog telling you that the driver was successfully installed. Click **Finish** to close the wizard.

Manually Updating the 10/100 NIC Driver by Specifying a Directory

Although Windows 2000 reports that it found the correct driver for the Network Instruments 10/100 NIC, the standard driver that it has installed needs to be updated to work best with Network Instruments Probe or Observer.

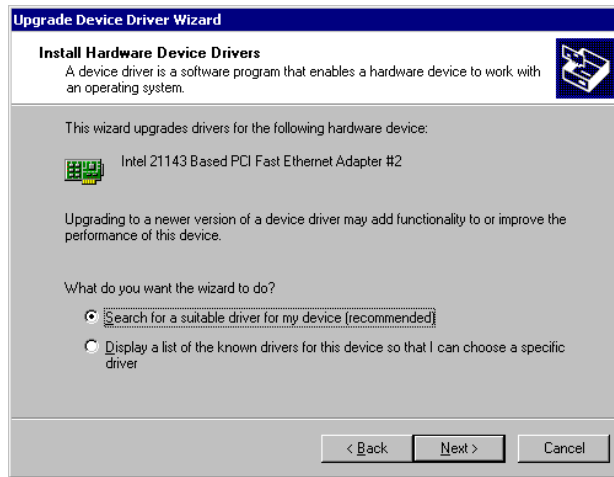
A custom driver is required to make the 10/100 NIC work optimally with Probe and Observer. Therefore you must manually update the driver as described in the following steps.

1. Right-click on My Network Places icon on the desktop and select **Properties** from the pop-up menu. The Network Connections folder is displayed.
2. Right-click on the **Intel 21143 Based PCI Fast Ethernet** connection and select **Properties** from the pop-up menu. Click **Configure...** on the **Intel 21143 Based PCI Fast Ethernet Adapter Properties** window. Click the **Driver** tab at the top of the resulting window, and the following dialog is displayed:

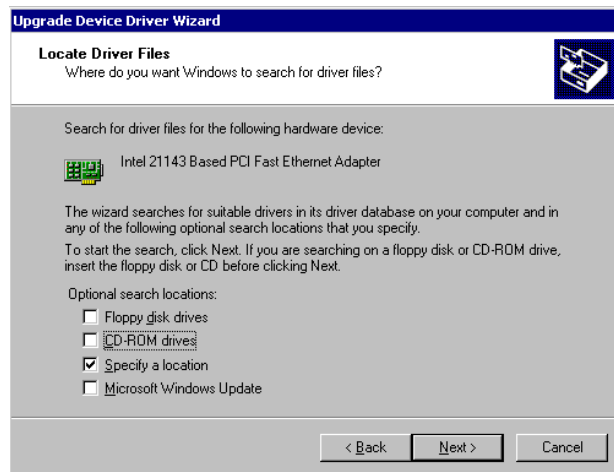


3. Click **Update Driver...**

The **Upgrade Device Driver Wizard's Welcome** dialog is displayed. Click **Next** and the wizard asks you whether you want to search for a driver or pick one from a list:

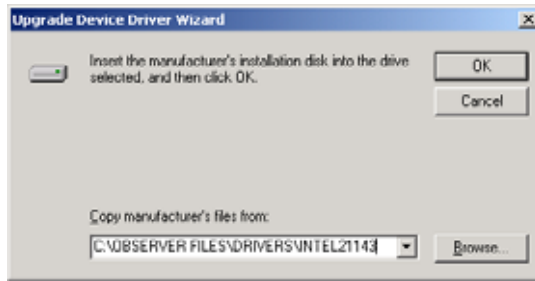


4. Choose “Search for a suitable device” and click **Next**. The wizard asks you where to search for the driver:



5. Choose “Specify a Location” and click **Next**.

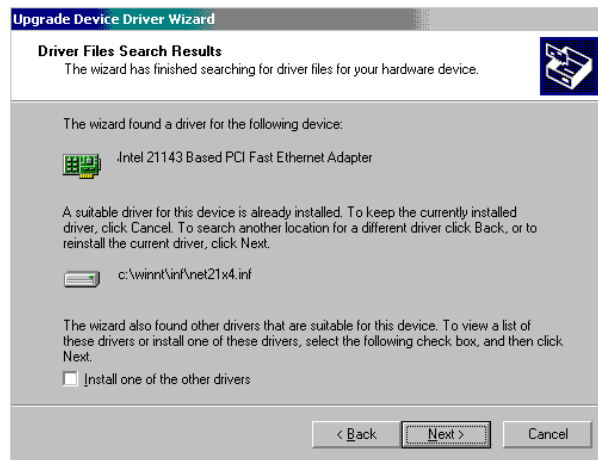
The wizard displays a file locator dialog:



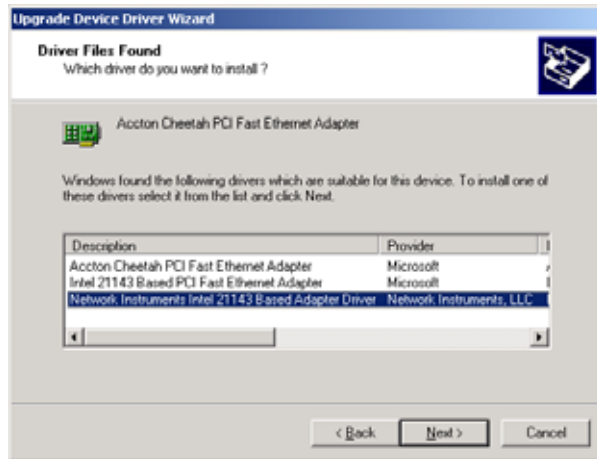
6. Enter (or browse to) the following path (assuming the Observer directory is C:\Observer):

c:\Observer Files\drivers\intel21143\win2000

7. Click **OK**, and the following dialog is displayed:



8. Choose “Install one of the other drivers” and click **Next**. The wizard shows a list of drivers to pick from:



9. Choose “Network Instruments Intel 21143 Based Adapter Driver” and click **Next**. After installing the device driver, the wizard displays an information dialog telling you that the driver was successfully installed. Click **Finish** to complete the driver installation.

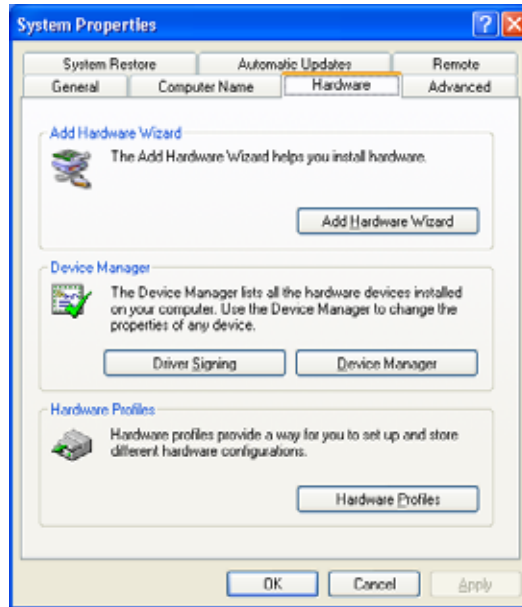
WAN and 10/100 Driver Installation: Windows XP

When you reboot after installing the NICs, Windows XP will find drivers in its own library that it reports as matching. These drivers will not work correctly with Probe and Observer software: You must manually update the driver for each card, using the drivers supplied on the Network Instruments Application CD.

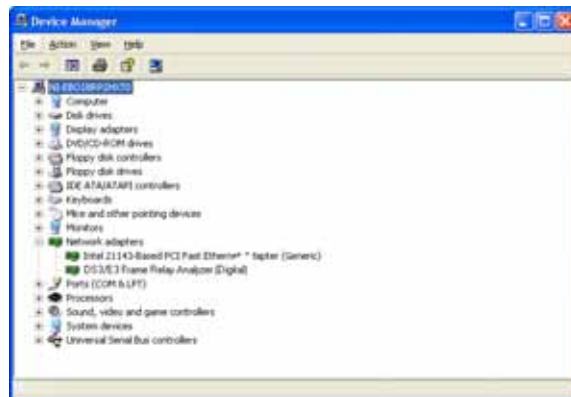
Follow the instructions in the section below to install the driver for each card.

Manually Updating the NIC Drivers

1. From the desktop **Start** menu, highlight **My Computer** and right-click. Choose **Properties...** on the pop-up menu. Click the **Hardware** tab on the resulting properties dialog, and the following is displayed:



2. Click **Device Manager...** The **Device Manager** browser is displayed:

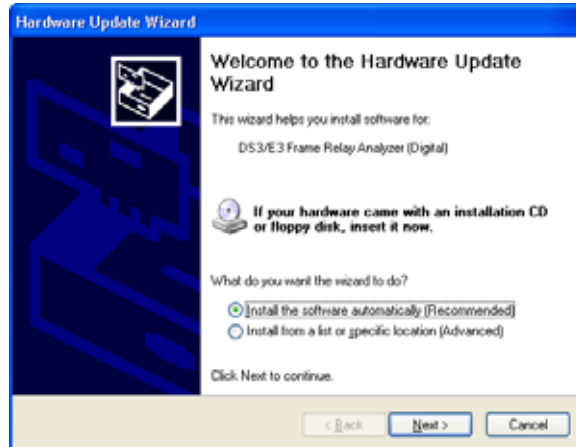


3. Browse to and right-click on the **Network Adapters > WAN Analyzer** driver (which will be named according to type: Digital T1/E1, DS3/E3, or Serial T1). Choose

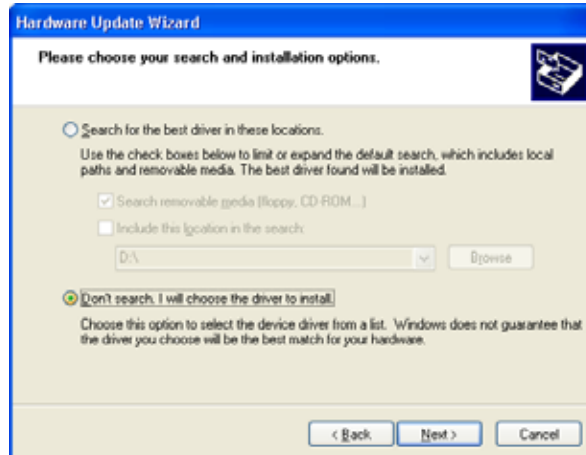
Properties... and click the **Driver** tab on the resulting dialog, which will display the properties for that device.

4. Click **Update Driver...**,

The **Hardware Update Wizard** asks you how you want it to install the driver:

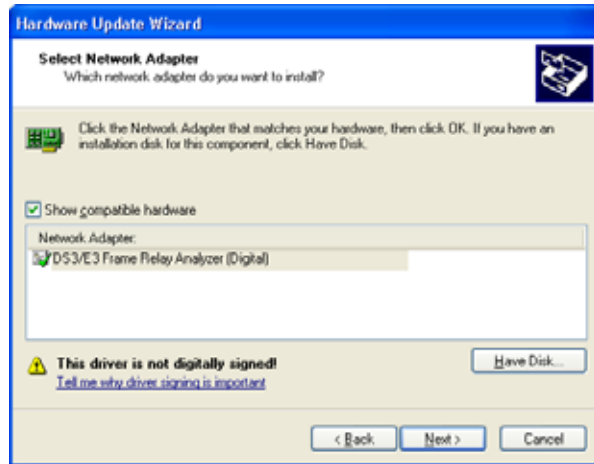


5. Choose “Install from a specific location” and click **Next**. The wizard then asks where to look for the file:



6. Select “Don’t search...I will choose the driver to install.” and click **Next**.

The Wizard then shows you what it thinks is the matching driver:



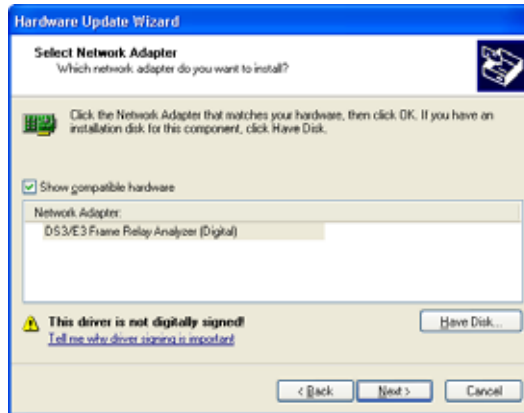
7. Click **Have Disk...**, and a file locator dialog is displayed:



8. Enter (or browse to) the following path and click **OK** (assuming your Observer directory is C:\Observer Files):

C:\Observer Files\Drivers\WAN

The wizard then displays the driver it found:



Depending on which card you have installed, one of the following adapters will be listed:

DS3/E3/HSSI WAN Analyzer (Digital)

T1/E1 WAN Analyzer (Digital)

T1 WAN Analyzer (Serial)

9. Click **Next**.

Windows informs you that the driver lacks a Microsoft digital signature:



10. Click **Continue Anyway**. Network Instruments has tested and verified that the driver works correctly with Probe and Observer on Windows XP.
11. After the wizard finishes installing the driver, Click **Finish** to close the confirmation dialog.
12. Repeat these same steps for updating the 10/100 NIC. When asked to specify a location for the driver, enter (or browse to) this path (assuming C:\Observer Files is your Observer directory):

c:\observer files\drivers\intel21143\win2000

13. Click through the rest of the wizard as you did for the 10/100 driver. After you click **Finish...** on the last dialog, the custom driver installation is complete.

Configuring Ports Into Logical Links

You must define the physical *ports* on the WAN interface card or cards into logical *links*. Each WAN interface card includes 1, 2 or 4 physical ports. By using the WAN Driver Configuration tool to define logical links consisting of 1 or more ports, you will be able to:

- in the case of links with more than one port, obtain a cumulative view of statistics from more than one port
- in all cases, create meaningful names that you will see in the Observer probe list.

A good situation in which to view multiple ports as a single link is in the case of a pair of load-balancing WAN lines. Some link groupings make no sense and are not recommended, such as configuring a link consisting of ports connected to WAN lines coming from separate ISPs. Note that you can only create links from ports of the same type; for example you cannot create a link that contains both HSSI and DS3 ports.

Starting the Configuration Utility

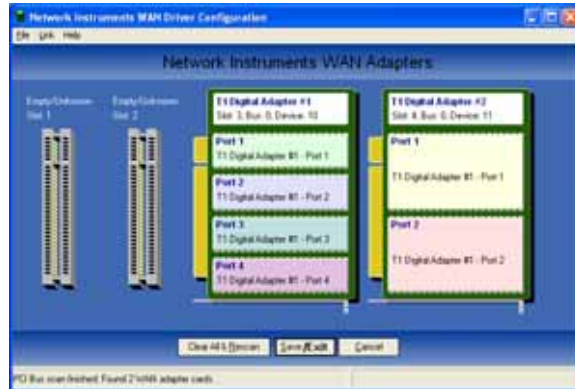
Before you start the configuration utility, make sure you have closed Observer and shut down any Network Instruments Probe instances that may be running.

Click on **Start->Observer->WAN Driver Configuration**.

The configuration tool scans the system for NI WAN interface cards, displaying them in the order they are physically installed in the bus. Each card is identified by bus and device # (displayed at the top of the card), and the number of the physical slot the card occupies in the PC bus.

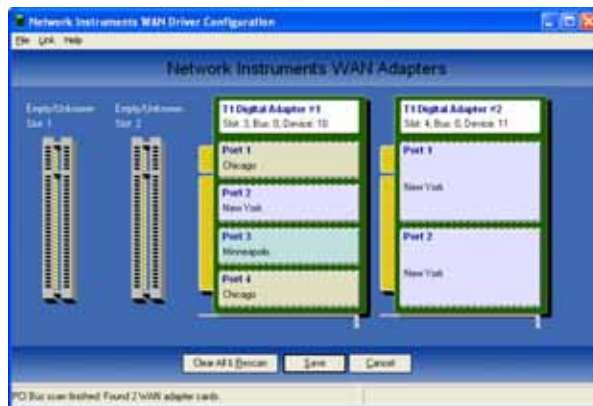
The ports on each card are listed under the card ID label, along with any logical links the port is associated with. If this is the first time the utility has been run, (or you have

performed a **Clear All** and **Rescan**), the utility will assign a logical link to each port, as shown in this two-card example:



To create a link, use Shift+Click to select the ports you want to add to the link and choose **Link->Add Selected Ports to Link->New...** from the main menu (or right-click menu). The utility prompts you to name the link. As you create links, they are added to the **Link** menu for easy selection.

The example below shows the display after a number of logical links have been configured. Note that the New York link includes physical ports from both interface cards. The color coding helps you see immediately which ports belong to the same link:



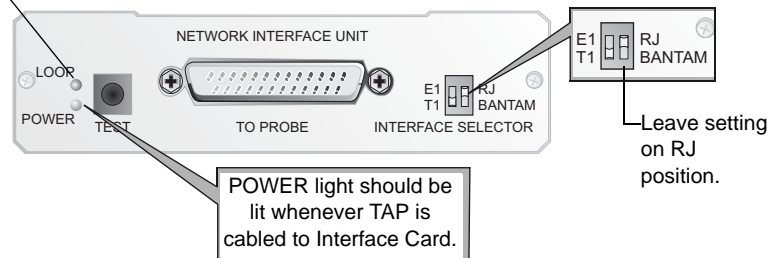
Click **Save/Exit** when you have configured the links you wish to create. The links you have configured will appear as named interfaces in Observer's WAN Probe list.

TAP Status LEDs and Switches

Take a moment to understand the TAP status LEDs, and the switch settings on the type of TAP you have installed on your Probe.

Digital T1/E1 TAP

LOOP Should remain unlit for normal operation.



Digital DS3/E3 TAP

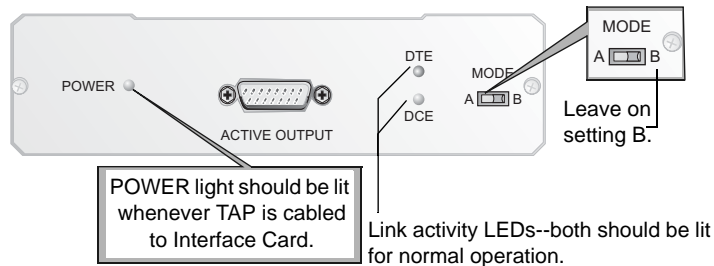
Loss of Signal,
—**unlit** when the
given device
(DTE or DCE)
drops carrier.



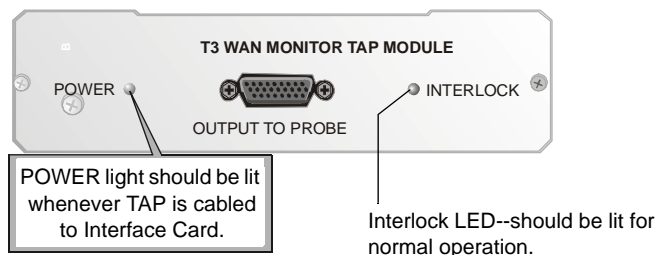
POWER light should be lit
whenever TAP is cabled to
Interface Card.

Loss of Frame
—**unlit** when the
given device
(DTE or DCE)
drops a frame.

Serial T1 TAP



HSSI TAP





Running Observer Software with the WAN Probe

After you have installed the WAN Probe Kit hardware, drivers, and Probe software, you can run Network Instruments Observer to connect to the Probe and begin analyzing the network. To connect to the Probe, follow these steps:

1. Start Observer. From the **Tools** menu, select **Redirect Probe...**
2. Enter the name and IP address of the Probe system.

You can now select the Probe from the Observer Probe list. Observer works with the WAN Probe just as it does with any other Network Instruments Probe, with a number of differences, which are described below.

WAN Probe/Device Setup

Before you can analyze the WAN link, you must set some device options. Right-click on the WAN icon in the Probe List and select **Probe or Device Setup** from the pop-up menu (or from the **Options** menu). Depending on what type of WAN link you are analyzing, click the **T1/E1**, **DS3/E3/HSSI**, **Serial T1/E1**, or **Serial DS3/E3** tab.

Digital DS3/E3/HSSI Probe Settings

Setting	Explanation
WAN/Frame Relay Type	Choose DS3 (T3) , E3 or HSSI to match the type of link you are analyzing.
Encapsulation	<p>You must set this to match the settings on the frame relay CSU/DSU. The encapsulation options are:</p> <ul style="list-style-type: none">-ATM-DXI - ATM Data Exchange-Frame Relay - Cisco-Frame Relay - IETF Standard-HDLC - Cisco Proprietary-LAPB (modulo-128)-LAPB (modulo-8)-PPP - Point-to-Point Protocol-X.25 over LAPB (modulo-128)-X.25 over LAPB (modulo-8)
Subprotocol	<p>If ATM or LAPB is the selected encapsulation method, you must choose the subprotocols on the link.</p> <p>ATM subprotocol choices are NLPID and SNAP multi-protocol; LAPB subprotocol choices are IP and Ethertype multi-protocol</p>
Fractionalized	Check if your link is configured for fractionalized operation.
Bandwidth	Set to match the bandwidth setting of the link you are analyzing.

Digital T1/E1 Probe Settings

Setting	Explanation
WAN/Frame Relay Type	Choose T1 or E1 to match the type of link you are analyzing.
Encapsulation	<p>You must set this to match the settings on the frame relay CSU/DSU. The encapsulation options are:</p> <ul style="list-style-type: none">-ATM-DXI - ATM Data Exchange-Frame Relay - Cisco-Frame Relay - IETF Standard-HDLC - Cisco Proprietary-LAPB (modulo-128)-LAPB (modulo-8)-PPP - Point-to-Point Protocol-X.25 over LAPB (modulo-128)-X.25 over LAPB (modulo-8)

Setting	Explanation
Subprotocol	If ATM or LAPB is the selected encapsulation method, you must choose the subprotocols on the link. ATM subprotocol choices are NLPID and SNAP multi-protocol; LAPB subprotocol choices are IP and Ethertype multi-protocol
Link 1 and Link 2 Channel Settings (Note that for the link and settings to be activated, you must check the “On” checkbox for that link).	
Fractionalized	Check if this link is configured for fractionalized operation.
Channel selector checkboxes	Choose the channels you want to be included in the analysis.
Include in Util. Thermometer.	Check if you want to include statistics from this link in the Bandwidth Utilization Thermometer.

Serial T1/E1 Probe Settings

Setting	Explanation
WANFrame Relay Type	Choose T1 or E1 to match the type of link you are analyzing.
Encapsulation	You must set this to match the settings on the frame relay router. The encapsulation options are: -ATM-DXI - ATM Data Exchange -Frame Relay - Cisco -Frame Relay - IETF Standard -HDLC - Cisco Proprietary -LAPB (modulo-128) -LAPB (modulo-8) -PPP - Point-to-Point Protocol -X.25 over LAPB (modulo-128) -X.25 over LAPB (modulo-8)
Fractionalized	Check if your link is configured for fractionalized operation.
Bandwidth	Set to match the bandwidth setting of the link you are analyzing.

Operating Observer Passively

When analyzing a WAN link via the Observer Probe, Observer runs “passively.” Passive operation guarantees that analysis will not affect the WAN link; however, it does have some implications when running Observer. Because there is no link over which the Probe system can transmit frames on the link, the following features are unavailable:

- Traffic Generation
- Collision Test

- Efficiency History
- Replay Packet Capture

Analyzing a WAN Link with Observer

In general, the WAN analysis works much like Ethernet analysis. One difference is that, when appropriate, Observer identifies WAN links by their Data Link Connection Identifier (DLCI) rather than by MAC address as is done with standard protocol analysis. In addition, many WAN statistical modes break out the data by DCE, DTE, and summary to reflect the full-duplex nature of WAN links. Modes unrelated to WAN analysis are greyed out and unavailable.

The following sections describe how the available Observer modes operate to analyze a WAN link.

Discover Network Names

To access this mode, choose **Tools->Discover Network Names**

Discover Network Names mode will show DLCIs instead of MAC addresses. You can also define the Committed Information Rate for each DLCI you are monitoring with WAN Observer.

Setting the Committed Information Rate (CIR) for a DLCI

The Committed Information Rate defines the guaranteed bandwidth for a WAN connection. If you want Observer's WAN Vital Signs and WAN Load by DLCI to monitor CIR compliance, you must specify the CIR. A number of WAN triggers and alarms also use this information, allowing you to be notified if the link is not performing to the CIR.

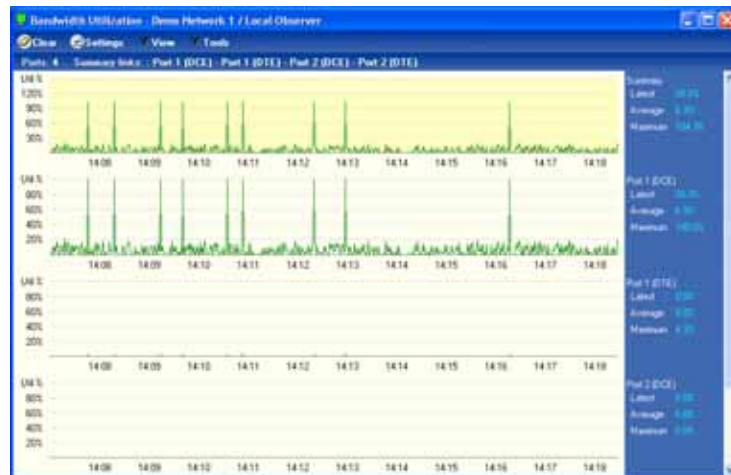
To set the CIR for a DLCI or group of DLCIs, click the edit DLCI CIR button on the Discover Network Names mode window. The following dialog is displayed:



Add a DLCI (or select one from the list and click **Modify**). Type or use the spinbox to set the CIR in Kbits/sec for the DLCI. Click OK when you are done.

WAN Bandwidth Utilization

To see the percentages of bandwidth saturation on DCE, DTE and DCE+DTE (Summary) for each configured link, choose **Statistics->Bandwidth Utilization**. The mode starts automatically:



WAN *links* have two *ports* (DCE and DTE), so for a dual link T1, you could display up to 5 charts (including the summary). The mode is available in chart,

pie, graph and dial views. The display setup dialog (click **Settings** to access), lets you choose what ports to display as well as color and scale options.

The Bandwidth Utilization display is not subject to any filters as it compares the actual activity on the network to the network's theoretical capacity.

WAN Vital Signs by DLCI

In WAN Observer, the Network Vital Signs display is replaced by the WAN Vital Signs by DLCI mode. This mode provides a summary of the errors occurring on a WAN link (E1/T1/DS3/E3).

You can choose what portion of traffic you wish to view from the list box in the upper left corner of the window: DCE, DTE, or Summary.

DTE (Data Terminal Equipment), in the context of a WAN link, refers to the DSU/CSU. DCE (Data Circuit-terminating equipment) refers to the WAN switch (which may reside remotely at the line provider's site). Summary view shows a concatenation of traffic from both ends of the link.

List View

The following statistics are shown, broken down by DLCIs (which are listed in the leftmost column). You can change the sort order by clicking on any of the column headings:

Column	Description
DLCI	Data Link Connection Identifier of the statistics that follow.
DCE KBits/s Max	The maximum bit rate sensed so far from the DCE side of this DLCI, in Kbits per second.
DTE KBits/s Max	The maximum bit rate sensed so far from the DTE side of this DLCI, in Kbits per second.
DCE Kbits/s Avg	The average bit rate sensed on the DCE side of this DLCI, in Kbits per second.
DTE Kbits/s Avg	The average bit rate sensed on the DTE side of this DLCI, in Kbits per second.
DCE FECN under CIR	The number of packets seen on the DCE side of the link that had the Forward Explicit Congestion Notification bit set, even though the bandwidth usage was within the Committed Information Rate (CIR). Normally this number should be zero. If bandwidth usage exceeds CIR, congestion is expected.

Column	Description
DTE FECN under CIR	The number of packets seen on the DTE side of the link that had the Forward Explicit Congestion Notification bit set, even though the bandwidth usage was within the Committed Information Rate (CIR). Normally this number should be zero. If bandwidth usage exceeds CIR, congestion is expected.
DCE BECN under CIR	The number of packets seen on the DCE side of the link that had the Backward Explicit Congestion Notification bit set, even though the bandwidth usage was within the Committed Information Rate (CIR). Normally this number should be zero. If bandwidth usage exceeds CIR, congestion is expected.
DTE BECN under CIR	The number of packets seen on the DTE side of the link that had the Backward Explicit Congestion Notification bit set, even though the bandwidth usage was within the Committed Information Rate (CIR). Normally this number should be zero. If bandwidth usage exceeds CIR, congestion is expected.

WAN Load by DLCI

In a WAN installation, Observer's Network Activity Display is called WAN Load by DLCI. This mode shows critical WAN transfer rate and congestion statistics in a number of formats. This display can show you the health of a WAN link at a glance and can warn of impending slowdowns due to congestion or other error conditions.

The WAN Load by DLCI mode can be viewed as a dial, graph, or list display. Except for list view, there are no setup options for WAN Load by DLCI mode. Every view includes a dropdown box that lets you select which DLCI you want to monitor.

To activate WAN Load by DLCI, choose **Statistics > WAN Load by DLCI**. Press the Play button to start the mode.

Dial View



The WAN Load by DLCI mode in dial view shows transfer rate, CRC error rate, FECN/BECN frame rates graphed on dial meters.

DLCI CIR Setup

Click **Settings** and then the **DLCI CIR Setup** tab to display a dialog that lets you enter DLCIs and their corresponding Committed Information Rates. You can either enter the DLCIs manually, or automatically add DLCIs from Observer's current alias list.

Graph View



The WAN Load display in graph view shows these same statistics (transfer rate, CRC error rate, and FECN/BECN frame rates) as superimposed spike meters. The Committed Information Rate (CIR) is also shown, allowing you to view the network activity against the baseline performance you have contracted to receive from your WAN service provider.

You can select line, point, or bar-style meter, and the colors for each statistic by right-clicking on the chart. The dropdown menus at the top of the display let you select what DLCIs to view, and how the chart should be scaled (linearly, logarithmically, or autoscale). For linear scales, you can also set the CIR or the line rate as the maximum value for the chart.

List View Display Properties

The Network Activity List view has only one display property option. To reset the columns to their default widths, click on the icon or go to **Mode Commands->Display Properties** (or simply right-click on the display).

To reset column widths to their default values, click Yes. To leave them in their present state, click No.

Top Talkers

Just as in standard Observer, Top Talkers shows the IP and MAC address of stations on your network sorted by volume of traffic generated and received. In WAN Observer, the MAC Address tab shows DLCIs sorted by volume of traffic. Also, the sorting and charting statistical criteria (such as percentage of packets, packets per second, etc.) that apply to WAN is a subset of those available for standard network analysis.



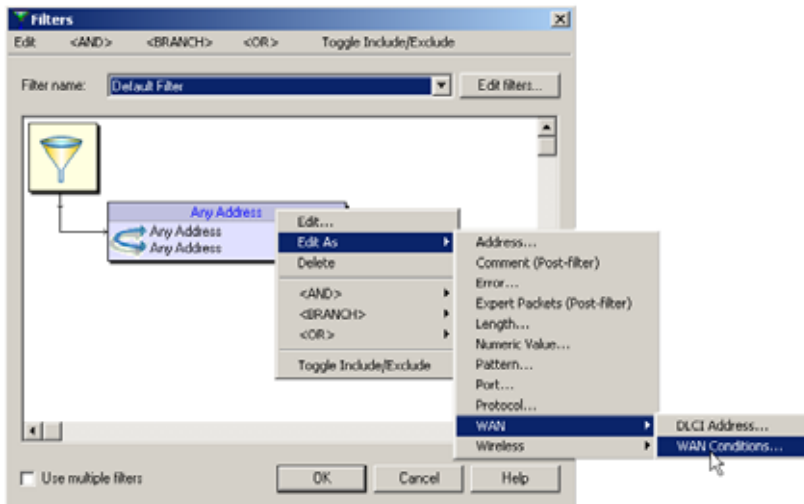
Address	In packets	Out packets	In bytes	Out bytes	% In packets	% Out packets	% In bytes	% Out bytes	Broadcasts	Multicasts
DLCI 16	12526	18675	5293	10766	71.639	7.294	0	0	0	0
DLCI 100	3906	2642	218736	146803	0.149	0	0	0	0	0
DLCI 0	1499	1006	0.614	41449	278.18	0.028	0	0	0	0

WAN Filtering

In addition to the standard Observer packet filtering rules (station address, pattern matching, etc.), there are two WAN-specific filtering rules available for use with WAN probes:

- DLCI Address, which lets you enter the number of the DLCI address you wish include or exclude.
- WAN Conditions, which let you include or exclude frames based on flow direction, forward and backward congestion, and discard eligibility.


To create a WAN filter rule, choose **Actions->Filter Setup for Selected Probe**. The default filter rule (any address<-->any address) is displayed. Select and right click on the rule to display the popup menu:



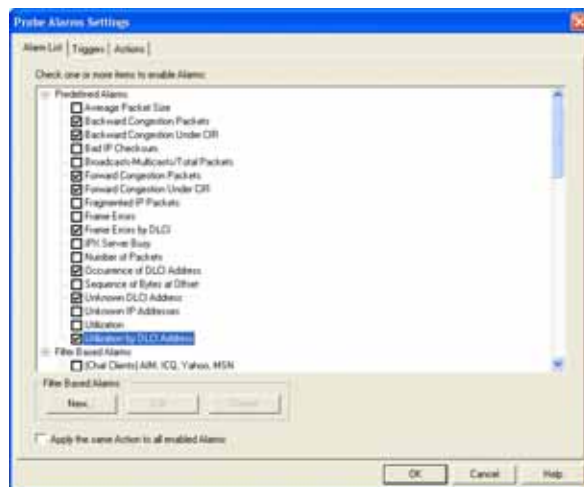
Choose the desired filter rule from the menu. A dialog is displayed letting you set the filter rule options. Refer to the Observer Reference Guide and online help for further information about using filters and editing rules.

Triggers and Alarms

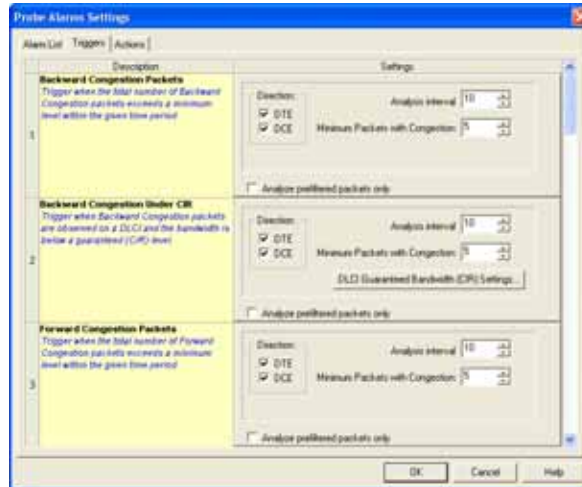
WAN Observer adds WAN-related criteria to the standard Triggers and Alarms mode.

Click the  button located in the lower left corner of Observer's main window. A dialog that allows you to select the Probe or Probes for which you want to set alarms is displayed:

The **Alarm List** tab lets you turn alarms on and off:



Check the alarms you wish to set, then click the **Triggers** tab to set the criteria by which the alarms will be triggered:



Note that most WAN alarms can be set on the DTE or DCE side or both; note also that the Committed Information Rate displayed is that which you set in Discover Network Names mode. See “Setting the Committed Information Rate (CIR) for a DLCI” on page 30. The **Actions** tab lets you define actions to launch if an alarm is triggered. You can log messages, send email, or even send a pager alarm.

Notes: